

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently amended) A dual-band FR4 chip antenna ~~wherein said dual-band FR4 chip antenna has a first operating band and a second operating band, and said dual-band FR4 chip antenna comprises comprising:~~

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~~an FR4 a chip base , wherein said FR4 chip base is made of an FR4 material;~~
~~a meandering radiating metal line formed on at least two opposite surfaces of~~
~~said chip base for generating a first operating band and a second operating band; and~~
~~a connecting point , which is used for connecting said meandering radiating~~
~~metal line to a signal transmission line.~~

2. (Currently amended) The dual-band FR4 chip antenna of claim 1, wherein ~~the total a length of said meandering radiating metal line is about 1/4λ(wavelength) of the a central frequency in of said first operating band.~~

3. (Currently amended) The dual-band FR4 chip antenna of claim 1, wherein the central frequency of said first operating band and ~~the a central frequency of said second operating band are the first two resonant frequencies of said meandering radiating metal line.~~

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4. (Currently amended) The dual-band FR4 chip antenna of claim 1, wherein the shape of said FR4 chip base is selected from a group consisting of a rectangular prism, a square prism and a cylinder.

5. (Currently amended) The dual-band FR4 chip antenna of claim 1, wherein said chip base is made of an (FR4 material) the dielectric constant of said FR4 chip base is between about 4 and about 5.

6. (Canceled)

7. (Currently amended) The dual-band FR4 chip antenna of claim 1, wherein said meandering radiating metal line comprises:

~~a lower metal line, wherein said lower metal line is located on a lower surface first segment formed on a first surface of said FR4 chip base, and said first surface is oriented toward said connecting point;~~

~~an upper metal line, wherein said upper metal line is located a second segment formed on an upper a second surface opposite to said first surface of said FR4 chip base; and~~

~~a connecting metal line, wherein said connecting metal line is located on one side of said FR4 chip base segment for connecting said first segment and said second segment.~~

8. (Currently amended) The dual-band FR4 chip antenna of claim 7, wherein said lower metal line first segment comprises:

a first lower horizontal line substantially U-shaped segment, wherein one end of said first lower horizontal line is vertically having one end connected to one end of said connecting segment, and the other end connected to said transmission line.

9. (Currently amended) The dual-band FR4 chip antenna of claim 7, wherein said upper metal line second segment comprises:

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a first upper horizontal line substantially U-shaped segment, wherein having one end of said first upper horizontal line is connected to the other end of said connecting metal line segment; and

a first upper vertical line; substantially L-shaped segment on the same surface plane of said U-shaped segment of said second segment, wherein one end of said first upper vertical line is connected to the other end of said first upper horizontal line; having one end connected to the other end of said U-shaped segment of said second segment.

a second upper horizontal line, wherein one end of said second upper horizontal line is connected to the other end of said first upper vertical line;

a second upper vertical line, wherein one end of said second upper vertical line is connected to the other end of said second upper horizontal line, and said second upper vertical line is extended to about the middle of one side of the upper surface of said FR4 chip base; and

a third upper horizontal line, wherein one end of said third upper horizontal line is connected to the other end of said second upper vertical line, and the length of said

~~third upper horizontal line is shorter than said first upper horizontal line and said second upper horizontal line.~~

10. (Currently amended) The dual-band FR4 chip antenna of claim 7, wherein a width of said meandering radiating metal line ~~has a plurality of widths~~ is variable while forming on said chip base.

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11. (Canceled)

12. (Canceled)

13. (Currently amended) The dual-band chip antenna of claim 1, further comprising: ~~wherein said dual-band FR4 chip antenna is mounted on a microwave substrate having a ground surface, and one portion of an area where said microwave substrate contacts said dual-band FR4 chip antenna is not covered with said ground surface, and said signal transmission line is located on said microwave substrate.~~

a microwave substrate for mounting said chip base and forming said signal transmission line.

14. (Currently amended) A dual-band FR4 chip antenna, ~~wherein said dual-band FR4 chip antenna has a first operating band and a second operating band, and said dual-band FR4 chip antenna comprises~~ comprising:

~~an FR4 a chip base , wherein said FR4 chip base is] made of an FR4 material[,~~
~~and the dielectric constant of said FR4 chip base is between about 4 and about 5;~~

~~a meandering radiating metal line , wherein said meandering radiating metal line~~
~~is formed on at least two opposite surfaces of said FR4 chip base for generating a first~~
~~operating band and a second operating band, and having the total a length of said~~
~~meandering radiating metal line is about 1/4λ(wavelength) of the a central frequency in~~
~~of said first operating band; and~~

~~a connecting point , which is used for connecting said meandering radiating~~
~~metal line to a signal transmission line.~~

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15. (Currently amended) The dual-band FR4 chip antenna of claim 14, wherein
the central frequency of said first operating band and ~~the a~~ central frequency of said
second operating band are the first two resonant frequencies of said meandering
radiating metal line.

16. (Currently amended) The dual-band FR4 chip antenna of claim 14, wherein
~~the a~~ shape of said FR4 chip base is selected from a group consisting of a rectangular
prism, a square prism and a cylinder.

17. (Currently amended) The dual-band FR4 chip antenna of claim 14, wherein
said meandering radiating metal line ~~further~~ comprises:

~~a lower metal line, wherein said lower metal line is located on a lower surface of~~
~~said FR4 chip base, and said lower metal line comprises:~~

~~a first lower horizontal line, wherein one end of said first lower horizontal line is vertically connected to said transmission line;~~

~~a first lower vertical line, wherein one end of said first lower vertical line is connected to the other end of said first lower horizontal line, and~~

~~a second lower horizontal line, wherein one end of said second lower horizontal line is connected to the other end of said first lower vertical line;]~~

~~an upper metal line, wherein said upper metal line is located on an upper surface of said FR4 chip base, and said upper metal line comprises:~~

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~~a first upper horizontal line substantially U-shaped segment formed on a first surface of said chip base, having one end connected to said transmission line, and said first surface is oriented toward said connecting point;~~

~~a substantially U-shaped segment formed on a second surface opposite to said first surface of said chip base;~~

~~a first upper vertical line substantially L-shaped segment on the same surface plane of said substantially U-shaped segment, having ; wherein one end of said first upper vertical line is connected to one end of said first upper horizontal line substantially U-shaped segment of said second segment; and~~

~~a second upper horizontal line, wherein one end of said second upper horizontal line is connected to the other end of said first upper vertical line;~~

~~a second upper vertical line, wherein one end of said second upper vertical line is connected to the other end of said second upper horizontal line, and said second upper vertical line is extended to about the middle of one side of the upper surface of said FR4 chip base; and~~

~~a third upper horizontal line, wherein one end of said third upper horizontal line is connected to the other end of said second upper vertical line, and said third upper horizontal line is shorter than said first upper horizontal line and said second upper horizontal line; and~~

~~a connecting metal line, wherein said connecting metal line is located on one side of said FR4 chip base, and one end of segment for connecting the other end of said connecting metal line substantially U-shaped segment formed on said first surface is connected to the other end of said second lower horizontal line substantially U-shaped segment formed on said second surface, and the other end of said connecting metal line is connected to the other end of said first upper horizontal line.~~

18. (Currently amended) The dual-band FR4 chip antenna of claim 14, wherein a width of said meandering radiating metal line has a plurality of widths is variable while forming on said chip base.

19. (Canceled)

20. (Currently amended) The dual-band FR4 chip antenna of claim 14, wherein ~~said dual-band FR4 chip antenna is mounted on a microwave substrate having a ground surface, and one portion of an area where said microwave substrate contacts said dual-band FR4 chip antenna is not covered with said ground surface, and said signal transmission line is located on said microwave substrate further comprising:~~

a microwave substrate for mounting said chip base and forming said signal

transmission line.

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